Ecdysiostatins in insects

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The biosynthesis of ecdysteroids in insects is controlled by peptide hormones that originate in the brain as well as in non-neural tissues of the periphery (1). The most prominent family of positively-acting peptide hormones ('ecdysiotropins') are the prothoracicotropic hormones. Only recently a peptide was observed that fulfills criteria of an 'ecdysiostatin' (2). This hexapeptide was isolated from the ovaries of flies (*Neobellieria bullata*). Since the peptide was found to repress the biosynthesis of trypsin-like enzymes in the digestive tract of flies and the ovarian development it was named 'trypsin-modulating oostatic factor', *Neb*-TMOF (3).

When tested *in vitro* with ring glands of blowflies, *Neb*-TMOF was able to inhibit ecdysone biosynthesis. The effect was immediate (within 10 min) and complete (99 % inhibition at 0.5 µM). Half-maximal inhibition was reached at a concentration of 5 nM. The peptide inhibited ecdysone biosynthesis reversibly and affected formation of ecdysone rather than its secretion. *Neb*-TMOF increased the level of cAMP in ring gland cells. Effectors that usually elevate the intracellular cAMP level could mimic the ecdysiostatic effect of the peptide (4). Also calcium ions appear to be involved in the control of ecdysone secretion by ring gland cells.

Neb-TMOF showed ecdysiostatic activity *in vivo*. When the peptide was injected into larvae the ecdysteroid content was diminished and puparium formation was delayed.

When fly extracts were fractionated according to size by chromatography, and the effect of fractions on ring glands were tested, several factors with ecdysiotropic and ecdysiostatic activity were observed. This suggests that the biosynthesis of ecdysteroids is under the control of multiple factors that together form a complex network.

References

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